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## Technical note

# Novel way to determine the size of tracheostomy tubes using computed tomographic Thorax or Pulmonary Angiogram scans during the COVID-19 pandemic\*

A.O. Green<sup>\*</sup>, A.D. Chellappah<sup>1</sup>, K. Fan<sup>2</sup>, P.D. Stenhouse<sup>3</sup>

*Department of Oral and Maxillofacial Surgery, King's College Hospital, London SE5 9RS*

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Up to June 2020, 232 patients were admitted to Intensive Care Units (ICU) at King's College Hospital (KCH), London due to COVID-19. Our Oral and Maxillofacial Surgery Unit received 51 referrals for surgical tracheostomies. With 9623<sup>1</sup> admissions to ICU nationally, there was a shortage of the commonly used Tracoe<sup>®</sup> twist tracheostomy tubes (Tracoe Medical, GmbH) with inner and outer cannulas and a subglottic suctioning port.

Appropriate sizing and selection of tracheostomy tubes in the Intensive Care population is essential, with patients remaining intubated for prolonged periods. Correct sizing, for which there are no recognised guidelines, minimises the likelihood of potential complications such as inadequate ventilation, dislodgement, cuff leaks, and bleeding. Selection is based upon gender, body habitus, existing endotracheal tube size, and a desire for the end of the tube to be 2–3 cm from the carina.<sup>2,3</sup>

The majority of patients admitted underwent CT Thorax or Pulmonary Angiogram scans during their diagnostic evaluation or to assess disease progression. As the number of admissions to ICU and tracheostomy referrals increased and the national shortage of tracheostomy tubes worsened, it was essential we optimised scarce resources.

We considered whether these CT scans could be used to guide selection of tracheostomy tubes and conserve supplies, minimise operative time, and reduce physiological stress to the patient associated with multiple tracheostomy changes.

For 11 patients of the 51 who were referred to us for tracheostomies, we used our institution's radiological imaging software (Sectra AB) to preoperatively select the appropriately-sized tracheostomy tube.

Using multiplanar reconstruction, we measured the distance in millimetres on sagittal views (**Fig. 1**) from:

- 1) The skin to the anterior tracheal wall at a level 50% of the distance from the inferior thyroid cartilage to the superior aspect of the manubrium of sternum.
- 2) The anterior tracheal wall to the posterior tracheal wall at a 45° angle.
- 3) The posterior tracheal wall to a point 30mm above the level of the carina.

We compared these measurements with the size of various Tracoe<sup>®</sup> twist tracheostomy tubes in order to select the appropriate tube (**Fig. 2**). Only two patients (18.2%) required tube changes intraoperatively after videobronchoscopy; one

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\* Corresponding author. Tel.: +44 07 399550184.

E-mail addresses: [alexandra.green1@nhs.net](mailto:alexandra.green1@nhs.net) (A.O. Green), [a.chellappah@nhs.net](mailto:a.chellappah@nhs.net) (A.D. Chellappah), [kfan@nhs.net](mailto:kfan@nhs.net) (K. Fan), [philip.stenhouse1@nhs.net](mailto:philip.stenhouse1@nhs.net) (P.D. Stenhouse).

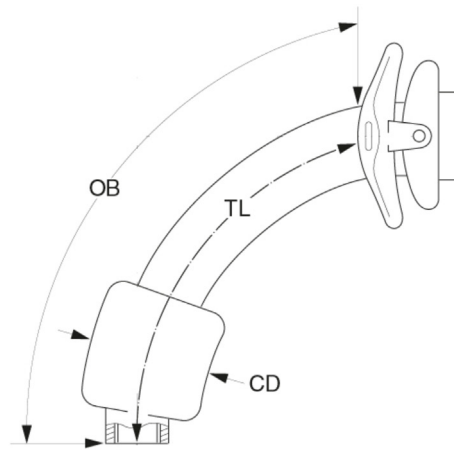
<sup>1</sup> Tel.: +44 07 311647857.

<sup>2</sup> Tel.: +44 07 970109988.

<sup>3</sup> Tel.: +44 07 941797892.



Fig. 1. Multiplanar sagittal computed tomographic thorax scan slice with measurements for tracheostomy tube sizing.



Size	OB (mm)	CD (mm)
07	80.5	26.0
08	83.0	28.0
09	88.5	30.0

Fig. 2. Trachoe Twist tracheostomy tube size measurements. Permission obtained from Trachoe® twist Tracheostomy Tubes for the use of this diagram. OB: outer bend, CD: cuff diameter.

patient due to a short tracheostomy tube, and the other due to the tracheostomy tube being too long. This was predicted preoperatively using the patient’s CT Thorax scan, but there had been no appropriately-sized tracheostomy tubes available within the hospital.

The results of our initial prospective study have indicated that this technique has led to more efficient use of scarce resources and no returns to theatre. We advocate that when a CT Thorax or Pulmonary Angiogram scan is available, it is used preoperatively to select the appropriate size of tracheostomy tube.

**Conflict of interest**

We have no conflicts of interest.

**Ethics statement/confirmation of patients’ permission**

Ethics approval not required. Patient permission was obtained.

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